

系所別：資訊管理學系碩士班

科目編號：A2-24-01

科目：離散數學

試題紙第 1 頁共 1 頁

1. Prove that for all nonnegative integers n , $1+3+5+\dots+(2n-1)=n^2$. (15%)
2. Prove that a forest with n vertices and m components has $n-m$ edges. (15%)
3. What is the coefficient of x^3y^9 in the expression $(2x-y)^{12}$? (15%)
4. What value of X is printed by a computer that runs the following program segment? Justify your answer. (Assume $N \geq 3$) (15%)

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X := 0;
FOR I := 3 TO N DO
  FOR J := 2 TO I-1 DO
    FOR K := 1 TO J-1 DO
      X := X + 1;
PRINT X

```

5. 試解 (20%)

$a_{n+1}^2 = 5a_n^2$, $a_n \geq 0$, $a_0 = 2$; 並求 a_{12} 之值。

6. Let the grammar G be defined by (20%)

$$S \rightarrow AB \quad B \rightarrow a \quad A \rightarrow Aa$$

$$B \rightarrow Sb \quad A \rightarrow bB$$

Give derivation trees for the following sentential forms:

- (A) baSb
- (B) baabaab